ROTH BROS. SMELTING CORP. CORRECTIVE MEASURES STUDY REPORT ADDENDUM

by:

H&A of New York
Rochester, New York

for:

New York State Department of
Environmental Conservation
Albany, New York

File No. 70185-43
March 1994

H & A OF NEW YORK

Geotechnical Engineers & Environmental Consultants

25 March 1994
File No. 70185-43

New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233

Attention: Mr. Steven J. Kaminski

Subject: Roth Bros. Smelting Corp. Corrective Measures Study Report Addendum

Gentlemen:

H&A is pleased to provide this Addendum to the July 1993 Roth Bros. Corrective Measures Study (CMS) report. As required by the NYSDEC 18 February 1994 letter, the CMS Addendum incorporates NYSDEC's comments on the CMS along with technical criteria, information, and data to address the comments. Accordingly, this Addendum, along with the July 1993 CMS report comprises our complete submittal for the Corrective Measures Study.

This Addendum is organized to incorporate the NYSDEC's comments in their entirety along with H&A's response to each comment immediately following.

The information contained within this Addendum and the July 1993 CMS Report satisfy and address the Corrective Measures selection criteria indicated in the 18 February letter from Steven Kaminski of the NYSDEC.

Both H&A and Roth Bros. request that the NYSDEC complete the review of this Addendum by 15 April so that the Corrective Measure implementation design/specifications documents may be completed. We are targeting construction of the Corrective Measure to begin during July/August 1994 and need NYSDEC's timely response to meet this objective.

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We look forward to NYSDEC's response at your earliest opportunity. Please do not hesitate to contact us if you have any questions.

Sincerely yours,
H&A OF NEW YORK

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N. Schwartz, Roth Bros.
J. Reidy, USEPA-Region 2

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I. COMMENT #1

NYSDEC COMMENT: "Section 3-03. states; "There is no evidence of groundwater contamination...". It should state DEC believes there is no need for groundwater corrective action at this site since contaminant levels are below action levels.

In the same section, semivolatile compounds (SVOC) were described as not being "...present in a pattern indicative of site release." DEC noted some sample locations where individual SVOCs exceeded soil ingestion action levels by more than an order of magnitude. Explain why these areas should not be targeted for corrective measures, providing information concerning possible sources of the SVOCs and supporting documentation of your final conclusion. DEC reserves the right to require SVOC corrective measures if we do not agree with your final conclusions."

1-01. GROUNDWATER

No response required; H&A concurs with the NYSDEC's statement that there is no need for groundwater corrective action at this site since contaminant levels are below action levels.

1-02. SEMI-VOLATILES

Five samples which exceeded soil ingestion action levels include 2 samples from the aluminum scrap storage area and 3 samples from Outfall 002.

Two samples (J8265, J8266) obtained in an asphalt covered area of the aluminum scrap storage area at the northwest corner of the Plant 2 main building were analyzed and contained concentrations of semi-volatiles. The semi-volatiles detected included: benzo(a) anthracene at 400-520 ppm, bis(2-ethylhexyl phthalate) at 12,000 to 25,000 ppm, and benzo(a)pyrene at 720 ppm. The semi-volatiles noted above are products of the combustion of fuels. Bis(2-ethylhexyl)phthalate is used in semi-volatile extraction and may, in part, be a lab contaminant. Benzo(a) anthracene and benzo(a)pyrene are also chemical constituents of roadbed and asphalt material. Insofar as detections such as these were not associated with waste storage locations, waste release points, or other pattern consistent with waste or environmental emission locations, they do not appear to represent a material subject to definition of waste disposed in a SWMU.

The semi-volatiles detected in the Outfall 002 drainage ditch sediment are products of fuels combustion and roadbed/asphalt components and likely occur in the drainage ditch due to its receiving runoff from on-site parking lots.

This sediment is already subject to the Corrective Measure based on lead content. Further, the preferred Corrective Measures alternative of polysilicate/stabilization is applicable to low to moderate concentrations of long-chain organic semi-volatile hydrocarbons. These components would therefore be remediated to non-leachable form, thereby addressing semi-volatile residues at the sediment detection locations.

In summary although the cleanup objective does not focus on the semi-volatile concentrations detected, the three sediment areas discussed above are contained within total lead >825 ppm remediation areas and would be effectively treated.

II. COMMENT #2

NYSDEC COMMENT: "DEC reserves comment on Section 3-04. until the New York State Department of Health (DOH) completes its review of the Risk Assessment calculations. To consider alternative corrective measures scenarios, you must perform three (3) soil volume calculations: 1) Pb at 250 ppm and PCBs at less than 1.0 ppm; 2) Pb at 500 ppm and PCBs at 10 ppm; and 3) Pb at 825 ppm and PCBs at 25 ppm. This will allow cost comparisons of different cleanup levels for each alternative. Please include the actual calculations used to arrive at the various soil volumes in the CMS addendum."

2-01. VARIABLE CONCENTRATION SCENARIOS

In our Corrective Measures study we recommended cleanup criteria of >825 ppm total lead, >25 ppm PCBs and >5 ppm TCLP lead. These cleanup levels were determined using a health and regulatory-based analysis which investigated environmental and health benefits, without regard to cost. Lead levels are based on risk calculations. PCB levels are embodied in EPA's regulations.

Only after deciding on the most effective remedial technology to meet our chosen cleanup criteria, did we perform any cost analyses. Insofar as the CMS-identified levels adequately address human health and the environment, evaluation of the alternative scenarios identified by NYSDEC simply leads to consideration of more stringent clean-up levels on the basis of cost alone. The additional costs associated with the more stringent levels will not provide a proportionate increase in environmental and health benefits. The preferred corrective measure is, by definition, the most cost effective because it incorporates treatment of the amount of soil required to meet the risk- and regulatory-based objectives.

Notwithstanding the lack of relevance of these cost comparisons, we have performed the volume calculations and estimated ranges of cost increase in order to be responsive to NYSDEC. The requested information appears below.

Using Figures 1 through 3 estimated soil volumes were calculated using each of the three sets of concentration criteria as listed above. Volumes were determined for both total lead and PCBs for each of the three scenarios. See Table I for a summary of these volumes. The actual calculations used to obtain the various soil volumes are located in Appendix A.

The preferred Corrective Measure scenario presented in the CMS of total lead >825 ppm and PCBs >25 ppm would apply to approximately 21,042 tons of soil (see Figure 3) with total treatment and disposal costs ranging from $1,618,784 to $1,788,784 (lead and PCB costs combined-see Table 1).

When comparing total volumes using cleanup criteria of total lead >500 ppm and PCBs at >10 ppm rather than lead at >825 and PCBs >25 ppm, there is an overall increase in total volumes of 3,680 tons or 18% (areas included are shown on Figure 2). This 18% increase in total volume translates into an estimated 13% increase in treatment costs alone, with total costs ranging from $1,824,184 to $1,994,864 (refer to Table I).

And finally, a 62% or 12,911 ton increase of total volume occurs when using lead at >250 ppm and PCBs at >1.0 ppm rather than lead at >825 ppm and PCBs at >25 ppm (affected areas are shown on Figure 1). This 62 % increase in total volume translates into an approximate 45% increase in treatment costs alone, with total costs ranging from $2,340,672 to $2,511,352, (refer to Table I).

The cost increases calculated assume that treatment costs remain as shown on Table I. If NYSDEC were to also make the acceptable treatment criteria more stringent (i.e. lower the acceptable TCLP level to a value lower than 5 ppm for lead - see Comment #3), costs for all categories would increase above those shown.

Along with increases in estimated costs which occur when using lead cleanup levels of >250 ppm or >500 ppm and PCB cleanup levels of >1 ppm or >10 ppm, there are also on-site operational problems created for Roth Bros. For example, the lead thresholds of 500 ppm and 250 ppm result in soil being targeted for excavation and treatment that lies between the maintenance building at Plant 2, and at the northwest corner of the plant. Both locations are primary vehicle traffic routes and travel constriction points. Requesting corrective action in these two areas would create limitations in access to northern portions of Plant 2, limited access to loading docks at the east and north sides of Plant 2 building, and limited access to the lead baghouse area.

In summary, using lower, more-stringent threshold concentrations to target areas for clean-up increases estimated corrective measure costs above a level considered to be cost effective, creates operational problems for conduct of Roth's business, and does not create additional reduction of health or environmental risk proportionate to the reduction created by the preferred corrective measure.

III. COMMENT #3

NYSDEC COMMENT: "Section 4-02. indicates that soil leaching lead in excess of 5 ppm in the TCLP test be subject to treatment. Soil leaching lead in excess of 15 ppb (based on the N.Y.S. DOH groundwater standard) must also be examined for potential treatment to provide an alternative estimate."

3-01. COST VARIABILITY OF DIFFERENT TCLP-BASED CLEANUP LEVELS

The definition (USEPA, NYSDEC) for toxicity characteristic hazardous waste for lead is 5 ppm. Wastes with TCLP <5 ppm are not regulated under RCRA. Further, the criteria suggested in the NYSDEC comment is not achievable by the standard laboratory method for TCLP. The lowest quantifiable detection limit for TCLP lead in 0.1 ppm or 100 ppb.

If the acceptable treatment criteria were dropped to 0.1 ppm, the estimated volume of soil requiring treatment on the basis of change in the TCLP criteria would increase almost two and one-half times (from 7,889± tons to 20,136± tons) and the treatment costs on a per ton basis would also increase two and one-half times (from $56/ton to $140/ton).

The volume differences are derived from the areas detailed on Figure 4 and the calculations of volumes included in Appendix B. Note that the change in volume treated is based on the TCLP criteria alone. A large portion of this soil would be treated under the preferred alternative by virtue of concentration being >825 ppm total lead. However, the lower, more stringent level of acceptability after treatment (i.e. <0.1 ppm rather than <5 ppm) creates the cost multiplier of 2.5 x. Obviously, the impact on the project cost and implementabilty would be significant. We are unaware of any regulatory requirements for treatment of TCLP lead different than the 5 ppm threshold. Further, we are aware of no more-aggressive leaching model than the one used by USEPA to derive the 5 ppm TCLP threshold that could form a scientific basis for reducing the level of acceptable treatment to a TCLP level of 0.1 ppm.

IV. COMMENT #4

NYSDEC COMMENT: "The introduction to Section 6 gives cost estimates for each technology. In the addendum, detail capital costs (equipment, labor, etc.) for technology implementation, in addition to long term operation and maintenance costs discounted to present worth dollars. Show all calculations and assumptions. If costs are given in a per-ton format, you may instead detail those variables to which the project is price sensitive."

4-01. COST DETAILS FOR REMEDIAL TECHNOLOGIES

Using cleanup criteria as >825 ppm total lead and >25 ppm PCBs, the quantity of soil excavated and stabilized is estimated to be 19,034 tons (refer to Table I). In addition, >50 ppm PCB soil (2,008 tons) would need to be excavated, stabilized to remove potential RCRA-waste characteristics (for Pb), and disposed of off-site at an acceptable PCB facility. A detailed cost estimate for the preferred corrective measures alternative of polysilicate stabilization, using the above criteria, may be found in Appendix C. Only cost details for the preferred Corrective Measures technology are included within this Addendum, as approved during telecommunications with the NYSDEC on 9 March 1994.

Components of this cost estimate that are sensitive to changes in work scope primarily include: 1) changes in the criteria used to target areas for clean-up (see Comments #2 and #3); and 2) delays in Corrective Measure construction startup.

By decreasing the criteria to target clean-up areas below total lead = 825 ppm and PCBs = 25 ppm, increases are created in volumes to be excavated, treated, backfilled, and compacted, thereby increasing cost proportionately. This proportionate increase in cost is due to the $56/ton cost for volumes of soil within additionally-identified remediation areas (see response to Comment #2).

By changing the acceptable cleanup criteria to lower TCLP levels a 2 to 3 times increase in treatment cost would occur, because of additional costs incurred by increased quantities of reagents and possible retreatment being required (also see response to Comment #3).

Another possible change in work scope which could affect the cost of the Corrective Measure Construction would be a delay in the time of start-up. By initiating remediation late in the construction season, mob/demob costs are affected as well as possible increases in treatment costs due to lower curing temperatures. Communications with polysilicate stabilization vendors indicate that a start date any later than October, when daily temperatures average <60° would significantly limit if not prevent work performance. Temperatures in this range can create reagent gel formation, which can only be avoided by enclosing work areas. Specific cost increases cannot be determined at this time, but the timing of Corrective Measures performance is clearly a significant variable and should not be allowed to slip beyond August/September in our climatic conditions.

V. COMMENT #5

NYSDEC COMMENT: "In Section 6 the assumption is made that contaminated soil extends halfway between a "dirty" (i.e., contaminated) location and a "clean" (i.e. decontaminated) location. This is an incorrect assumption. Only soil between two areas that contain less than the target cleanup level of contaminants may be assumed to be left untreated. If excavation or treatment ceases somewhere between decontaminated and contaminated locations, a sample of soil from that point must be analyzed to demonstrate decontamination. It is important to note that sampling during remediation activities can cause costly delays unless accurate on-site field instrumentation can be employed for total lead analysis. A selective sampling program performed before remediation work begins could prove more economical."

5-01. FIELD/LAB METHOD TO GUIDE CORRECTIVE MEASURE

A selective sampling program is not required because we anticipate using a analysis program in support of corrective action at the Roth Bros. facility which will utilize field screening procedures for the detection of total lead and PCBs in soil matrices. PCBs analysis would be conducted using USEPA approved immunoassay analysis, and total lead concentration would be determined using an X-Ray Fluorescence (XRF) analyzer, generally as described below.

PCBs - Representative samples will be collected during the excavation of site soils and analyzed to determine if the concentration of PCBs present are <25 ppm, between 25 ppm and 50 ppm, or >50 ppm. The samples will be analyzed by "DRAFT" EPA Method 4030 "PCBs in Soil by Immunoassay" using competitive assays manufactured by Millipore under the trademark EnviroGuard. The standard reference materials for instrument calibration will be provided by Millipore and will be specific for the Aroclor mixture present. The analysis will be conducted on-site following the manufacturer's standard operating procedure (SOP). We anticipate that results should be available within one (1) hour of sample collection in order to direct on-going remediation activities.

Lead - In addition to PCB screening, total lead concentrations within the selected samples will be determined on-site using XRF analysis. A Source Excited Fluorescence Analyzer (SEFA-P) manufactured by HNu Systems will be operated at the facility concurrently with remediation activities. The instrument would be configured with a Cadmium-109 source element and Silicon/Lithium (SiLi) detector. The detection limit for the analysis should be less than 100 ppm total lead. Soil concentrations will be determined to be above or below the action level of 825 ppm for on-site treatment. Standard reference materials (SRMs) for instrument calibration will be based on NYSDOH certified laboratory analysis of site soils for total lead concentrations using EPA Method 7421. The SRMs of pre-analyzed site soils will be used to establish a linear calibration of the XRF SEFA-P. Analysis will be conducted within 1 hour of sample collection to provide real-time data for managing the remediation activities. Confirmation samples of site soils will be collected for off-site total lead analysis by EPA Method 7421 as a designated sub-population of soils selected for XRF analysis in the field.

VI. COMMENT #6

NYSDEC COMMENT: "Section 6.10.2 examined the process of secondary smelting. It seems that defining soil contaminated only with lead as a lead ore and shipping it to a primary smelter would be a more logical choice. However, since both processes require a lead concentration of 4-5%, neither would be useful at this facility and need not be examined further."

No response is required, H&A concurs with the NYSDEC's statement, and no further examination of secondary smelting as a remediation technique will be conducted.

VII. COMMENT #7

NYSDEC COMMENT: "Section 6-11, Alternative Screening Results, eliminated the option of excavation with off-site disposal. This alternative must be studied since its the only remedy that can achieve target cleanup levels for total lead."

7-01. "OFF SITE" DETAIL DESCRIPTION

Using target criteria of >825 ppm total lead and >25 ppm for PCB, the quantity of soil requiring excavation is estimated to be 21,042 tons. Details of a cost estimate for off-site disposal are included in Appendix C.

7-02. ABILITY TO ACHIEVE CLEANUP OBJECTIVE

Although a site cleanup objective, as stated above, would be met by excavating selected remedial areas, specific items need to be considered as reasons to eliminate this option. This method eliminates the hazardous exposure from the site itself, but exposure is instead transferred off-site to personnel transporting the material and other personnel who may come in contact with the contaminated soils, through possible elevation of airborne lead concentrations during transport and disposal activities.

Also, to be considered is the fact that all material transported off-site would need to be stabilized at the chosen landfill prior to its disposal. Instead, through the preferred Corrective Measure technology, contaminated soil could be similarly stabilized and remain on-site in a non-hazardous form.

Cost feasibility must also be examined, with a cost to remove soil to a landfill and stabilize being five times more than performing on-site stabilization. Using these items as well as previous information stated in the CMS it can be concluded that excavation does remediate the soil, but simply relocates the problem. Apparent health and environmental risks can be addressed by using the preferred corrective measure. Accordingly, there is no clear reason to excavate and dispose of off-site soils with <50 ppm PCBs, total lead <825 ppm, or TCLP lead >5 ppm.

VIII. COMMENT #8

NYSDEC COMMENT: "Section 7.1.1 describes how two samples B-1 and B-2 for bench scale test were sent to STS, the company which the CMS identified as the vendor for the Polysilicate Stabilization Process. The results are listed in Appendix C under B-1 initial, B-2 initial, and B-2 treated. Where is the B-1 treated results? Why was this data not included in the Appendix or its absence explained?

This same section also states that after stabilization the average particle size of the soil will increase by 10%, and thereby, reduce the risks of air entrainment and bioavailability. A 10% change in particle size does not seem likely to significantly alter such properties. This assertion should be quantified and clearly explained."

8-01. BENCH SCALE RESULTS

Results for sample B-1 treated were not included within Appendix C because initial results of sample B-1 were already lower than regulatory standards for TCLP based on pre-treatment testing. Therefore, actual treatment was not performed on sample B-1.

8-02. PARTICULATE SIZE INCREASE

The ex-situ polysilicate stabilization process increases the average size of soil particles by up to an order of magnitude (the Trezak process technical literature provides a range of 6x to 10x particle size increase). It is the overall volume increase which generally remains less than 10% due the friable, compactable nature of the resulting material after stabilization. A particle size increase of 6x to 10x significantly alters the risks of air entrainment and bioavailability to human receptors. This is demonstrated through use of the Stokes Law which describes the relationship between the particle density and particle diameter to the terminal or settling velocity of that particle.

$$V_t = \frac{g\, dp^2\, P_p}{18\, u}$$

where:
- V_t = settling or terminal velocity
- g = acceleration of gravity
- d_p = particle diameter
- P_p = particle density
- u = fluid (air) viscosity

From this equation, we observe that the settling velocity varies directly with the square of the particle diameter. With particle size increased by 6x to 10x, airborne particles will settle to the ground at a rate 36 to 100 times faster, significantly decreasing the possibility of off-site transfer.

Particles <15 um are of particular concern for human respiratory exposure. The soils on the Roth site are classified as silty gravel. Normal particle size for this soil type is 0.1 um to 75 um. An order of magnitude increase in particle diameter will significantly decrease the particles of risk for human respiratory exposure.

IX. COMMENT #9

NYSDEC COMMENT: "Section 7-04. mentions that short term groundwater monitoring will be needed if the Polysilicate Stabilization alternative is implemented. While this is true, a longer term monitoring program cannot be ruled out at this time."

9-01. GROUNDWATER MONITORING DURATION

During implementation of the chosen remedial technology groundwater monitoring will continue to be performed as NYSDEC has indicated is required. The NYSDEC has requested groundwater monitoring be performed during remediation and for a period of time following remediation, to confirm that there has been no increase in concentrations due to soil disturbances during construction. For cost estimation purposes, we assumed a period of time no greater than 5 years to determine Net Present Value costs of a period of monitoring to satisfy this criteria (see Appendix D).

X. COMMENT #10

NYSDEC COMMENT: "Roth Bros. may wish to also consider a chemical bonding technology such as MAECTITE or a combination of two or more technologies. The potential advantage of this type of technology is that is could provide a more secure long term solution. The decision to examine this option is entirely up to Roth Brothers."

10-01. MAECTITE METHOD EVALUATION

MAECTITE is an ex-situ chemical stabilization process, which according to its vendor converts leachable lead into mineral crystals species by a process similar, if not equivalent, to polysilicate stabilization. Heavy-metals contaminated soils are excavated and processed on site with a proprietary powdered chemical and proprietary liquid reagent and cured for 3 to 5 hours. The treated material is friable and may be backfilled and recompacted with conventional earth moving equipment, and remains workable over the long term.

As with polysilicate stabilization, this technology reduces the toxicity and mobility of lead. Measurement of performance is by TCLP analysis (as with polysilicate stabilization). The treated material can create up to a 36% reduction in volume although the developers caution potential users to plan on no net increase or decrease in volume. The MAECTITE technology is a mobile operation which would result in implementation requirements at the Roth Bros. site similar to polysilicate stabilization. The developers of this technology estimate the costs of implementation to be $33/ton for treatment. This value is included in the range of cost estimate detailed in Appendix D. Overall implementation costs are accordingly similar to polysilicate stabilization. Monitoring costs would also apply through the period of treatment. A CAMU designation would be required to allow effective implementation of this alternative.

10-02. ABILITY TO ACHIEVE CLEANUP OBJECTIVE

MAECTITE, as an ex-situ chemical stabilization process, appears to provide the necessary protection to groundwater resources and on-site/off-site human and environmental receptors. The application of this technology generally causes no volume increase, and has the potential to create volume reduction of up to 36%. The resulting phosphate mineral and soil mixture is friable and can be backfilled. This remedy would preserve the option of site expansion for Roth, equivalent to the identified preferred alternative of polysilicate stabilization. In terms of overall CMS evaluation, it should be considered an equivalent technology to the polysilicate stabilization.

As with other technologies represented by vendors to be equivalent to the polysilicate process, the MAECTITE process would require equivalent performance results from treatability studies. Further assuming acceptable treatability results, Roth Bros. would then need to consider business/contracting factors in selecting a final vendor, such as vendor capitalization, track record, and experience.

TABLE I

ROTH BROS. SMELTING CORP.
COMPARISON OF SOIL VOLUME AND ESTIMATED COST VARIATION
FOR THREE CONCENTRATION SCENARIOS

CRITERIA		VOLUME OF SOIL (cu. yds.)	MASS OF SOIL (tons)	TREATMENT COSTS $ PER TON	TREATMENT COSTS $ TOTAL	COMMENTS
Total Lead	>250 ppm	18,353 ±	25,695 ±	$56	$1,438,472 ±	Additional Costs incurred using this criterion: • Loss of storage space • Increase in quantity of backfill • Increased limitations in access to northern portion of Plant 2 and also lead baghouse area. • 28% increase in sq. ft. of asphalt repair.
PCBs	>1-<50ppm	4,464 ±*	6,250 ±	$56	$350,000±	
PCBs	>50 ppm	1,434 ±**	2,008 ±	$275-$360	$552,200-$722,880	
Total Lead	>500 ppm	15,960 ±	22,344 ±	$56	$1,251,264 ±	Additional Costs incurred using this criterion: • Loss of storage space • Increase in quantity of backfill • Increased limitations in access to northern portion of Plant 2 and also lead baghouse area. • 5% increase in sq. ft. of asphalt repair.
PCBs	>10-<50ppm	264 ±*	370 ±	$56	$ 20,720 ±	
PCBs	>50 ppm	1,434 ±**	2,008 ±	$275-$360	$552,200-$722,880 ±	
Total Lead	>825 ppm	13,596 ±	19,034 ±	$56	$1,065,904 ±	This criterion used for estimation purposes during the CMS.
PCBs	>25-<50 ppm	0 ±*	0 ±	$56	$ 0 ±	
PCBs	>50 ppm	1,434 ±**	2,008 ±	$275-$360	$552,200-$722,880	

Note:

1. Volume calculations based on areas shown in Figures 1 through 3, site boring data and calculations contained in Appendix A.
2. * = Volume of PCB contaminated soil designated for remediation, which is not included within areas of total lead excavation (see Figure 1 through 3).
3. ** = PCB volumes which will be required to be excavated and disposed of off-site.
4. Per ton treatment cost is only for >5 ppm TCLP lead levels and cost increases would occur with changes in the TCLP treatment requirements.
5. Soil volumes in cubic yards (cu. yd.) include a 1.2 bulking factor for in-place yardage conversion to excavated yardage. Conversion factor of 1.4 ton/cu. yd. used for tonnage calculation.
6. $56 a ton for treatment costs of lead and PCB <50 ppm soil was used as the conservative end of cost estimate range from Appendix D.

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APPENDIX A

Total Lead and PCBs Estimate Cost Details

HALEY & ALDRICH, INC.	CALCULATIONS	File No. 70185-43
		Sheet 1 of 4

Client: Roth Bros. Smelting Corp.	Date: 11 March '94
Project: CMS - Addendum	Computed By: MJC
Subject: Estimate #1 (Pb > 250 ppm; PCBs > 1 ppm)	Checked By:

1) Calculation of PCBs > 1 ppm Volume

Area 1
0.62 × 3.0 ft. = 1.86 ft.

Area 2
0.59 × 2.5 ft. = 1.48 ft

Area 3
0.16 × 2.5 ft. = 0.4 ft

Area 4
0.09 × 1.0 ft = 0.09 ft.

Area 5
0.10 × 1.0 ft = 0.10 ft

Area 6
0.10 × 1.0 ft = 0.10 ft.

Area 7
0.92 × 3.0 ft = 2.76 ft

Area 8
1.45 × 3.0 ft = 4.35 ft.

Area 9
0.24 × 2.5 ft = 0.60 ft

Area 10
0.09 × 1.5 ft. = 0.135 ft.

Area 11
0.08 × 1.0 ft = 0.08 ft.

Area 12
0.50 × 3.0 ft. = 1.50 ft.

Area 13
0.35 × 3.0 ft = 1.05 ft.

Area 14
2.60 × 4.0 ft = 10.4 ft

Area 15
5.16 × 3.5 ft. = 18.06 ft.

Area 16
0.13 × 1.0 ft = 0.13 ft.

Total = 43.095 ft × 100 ft × 100 ft.
Total = 430,950 CF / 27
Total = 15961 CY
Total = 15,961 (1.2 bulking factor)
Total = 19,153 (1.4 tons / CY)
Total = 26,814 tons

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HALEY & ALDRICH, INC.

CALCULATIONS

Client	Roth Bros. Smelting Corp.	File No.	70185-43
Project	CMS - Addendum	Sheet	2 of 4
Subject	Estimate #1 (Pb >250 ppm, PCBs > 1 ppm)	Date	11 March 94
		Computed By	MJC
		Checked By	

2) Calculation of PCBs >50 ppm Volume:

Area 1
0.24 × 3.0 ft = 0.72 ft

Area 2
0.33 × 3.0 ft = 0.99 ft

Area 3
0.38 × 4.0 ft = 1.52 ft.

Total = 3.23 ft. × 100 ft × 100 ft
Total = 32,300 CF / 27
Total = 1,196 CY (1.2 bulking factor)
Total = 1,435 Cy (1.4 ton / Cy)
Total = 2,008

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HALEY & ALDRICH, INC.	CALCULATIONS	File No. 70185-43
		Sheet 3 of 4

Client	Roth Bros. Smelting Corp.	Date	11 March '94
Project	CMS - Addendum	Computed By	MJC
Subject	Estimate #1 (Pb > 250 ppm, PCBs > 1 ppm	Checked By	

3) Calculation of Total Lead > 250 ppm

Area 1
0.62 × 3.0 ft. = 1.86 ft.

Area 2
0.08 × 1.5 ft = 0.12 ft.

Area 3
0.46 × 1.0 ft = 0.46 ft.

Area 4
0.13 × 3.0 ft = 0.39 ft.

Area 5
0.07 × 2.3 ft. = 0.161 ft.

Area 6
0.16 × 6.0 ft = 0.40 ft.

Area 7
0.09 × 4.0 ft 0.36 ft.

Area 8
0.07 × 1.3 ft. = 0.091 ft

Area 9
0.09 × 4.0 ft = 0.36 ft

Area 10
0.31 × 4.0 ft = 1.24 ft.

Area 11
0.70 × 3.0 ft. = 2.10 ft.

Area 12
0.95 × 3.0 ft = 2.85 ft.

Area 13
0.27 × 1.5 ft = .405 ft.

Area 14
0.09 × .1 ft = .009 ft.

Area 15
0.26 × 3.0 ft. = .78 ft.

Area 16
3.0 × 4.0 ft = 12.0 ft.

Area 17
5.06 × 3.5 ft = 17.71 ft.

Area 18
.71 × 1.0 ft = .71 ft.

Total = 42.006 ft × 100 ft × 100 ft.
Total = 420,060 CF / 27
Total = 15,558 CY (1.2 bulking factor.
Total = 18,670 Cy (1.4 tons / Cy)
Total = 26,137 tons

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HALEY & ALDRICH, INC.	CALCULATIONS	File No. 70185-43
		Sheet 4 of 4
Client: Roth Bros. Smelting Corp		Date: 11 March '94
Project: CMS - Addendum		Computed By: MJC
Subject: Estimate #1 (Pb > 250 ppm, PCBs > 1 ppm		Checked By:

For final total volumes need to subtract areas of PCBs > 1 ppm that are within total lead areas of 250 ppm:

PCB Areas

1.86 ft
0.40 ft
0.09 ft
0.10 ft
0.10 ft
2.10 ft
2.85 ft
0.135 ft
0.12 ft
0.78 ft
0.13 ft
+24.675 ft
33.04 × 100 ft × 100 ft = 330,400 CF = 12,237 CY in place = 14,684 Cy = 20,558 tons

∴ from page 1   26,814 tons
20,558 tons
6,256 tons of PCB's > 1 ppm

Also need to subtract areas of PCBs > 50 ppm that are within total lead areas of 250 ppm

0.33 ft
0.38 ft
0.71 ft × 100 ft × 100 ft = 7100 CF = 263 CY in place = 316 Cy = 442 tons

∴ from page 3   26,137 tons
442 tons
25,695 tons of total lead > 250 ppm

C:\L1AFH.FRP 3 June 1993

FOIL206871

HALEY & ALDRICH, INC.	**CALCULATIONS**	File No. 70185-43
		Sheet 1 of 3

Client	Roth Bros. Smelting Corp.	Date	10 March '94
Project	CMS - Addendum	Computed By	MJC
Subject	Estimate #2 (Pb > 500, PCBs > 10)	Checked By	[illegible]

1) Calculation of PCBs >10 ppm Volume:

Area 1

0.09 × 0.3 ft = 0.027 ft

Area 2

0.05 × 1.5 ft = 0.075 ft

Area 3

0.07 × 0.3 ft = 0.021 ft.

Area 4

0.24 × 2.5 ft = 0.60 ft.

Area 5

0.35 × 3.0 ft. = 1.05 ft.

Area 6

1.32 × 3.5 ft = 4.62 ft.

Total = 6.393 ft. × 100 ft × 100 ft
Total = 63,930 CF / 27
Total = 2,367 CY (1.2 bulking factor)
Total = 2,840 Cy (1.4 tons/Cy)
Total = 3,977 tons

2) Calculation of PCBs > 50 ppm Volume:

Area 1

0.24 × 3.0 ft. = 0.72 ft.

Area 2

0.33 × 3.0 ft. = 0.99 ft.

Area 3

0.38 × 4.0 ft = 1.52 ft.

Total = 3.23 ft. × 100 ft. × 100 ft.
Total = 32,300 CF / 27
Total = 1,196 CY (1.2 bulking factor)
Total = 1435 CY (1.4 tons/Cy)

3) Calculation of Total Lead >500 ppm Volume:

Area 1
0.62 × 3.0 ft = 1.86 ft.

Area 2
0.08 × 1.5 ft. = 0.12 ft.

Area 3
0.28 × 1.0 ft. = 0.28 ft.

Area 4
0.10 × 1.0 ft. = 0.1 ft

Area 5
0.07 × 2.3 ft = 0.161 ft.

Area 6
0.16 × 2.5 ft = 0.40 ft.

Area 7
0.09 × 4.0 ft = 0.36 ft

Area 8
0.07 × 1.3 ft. = 0.091 ft.

Area 9
0.09 × 4.0 ft. = 0.36 ft.

Area 10
0.31 × 4.0 ft = 1.24 ft.

Area 11
0.27 × 3.0 ft = 0.81 ft.

Area 12
0.43 × 3.0 ft = 1.29 ft.

Area 13
0.27 × 1.5 ft = .405 ft

Area 14
0.49 × 3.0 ft = 1.47 ft.

Area 15
3.08 × 4.0 ft = 12.32 ft.

Area 16
4.25 × 3.5 ft = 14.875 ft.

Area 17
0.09 × .1 ft = 0.009 ft.

Area 18
0.71 × 1.0 ft = 0.71 ft.

TOTAL = 36.861 ft × 100 ft × 100 ft.
TOTAL = 368,610 CF /27
TOTAL = 13652 CY (1.2 bulking factor)
Total = 16382 (1.4 tons / Cy)
Total = 22,935 tons

HALEY & ALDRICH, INC.	CALCULATIONS	File No. 70185-43
		Sheet 3 of 3

Client: Roth Bros. Smelting Corp.

Project: CMS - Addendum

Subject: Estimate #2 (Pb>500, PCBs >10)

Date: 10 March '94

Computed By: MJC

Checked By: SBW

For final total volumes need to subtract areas of PCBs >10 ppm that are within total lead areas of 500 ppm:

PCB Areas

1.05 ft
4.62 ft
0.027 ft
0.075 ft
+ 0.021 ft
5.793 ft

5.793 ft × 100 ft × 100 ft = 57,930 CF = 2146 CY in place = 2575 Cy = 3605 tons

∴ from page 1 3,977 tons
3,605 tons
371 tons of PCBs >10 ppm

Also need to subtract areas of PCBs >50 ppm that are within total lead areas of >500 ppm

PCB Areas

0.24 ft
0.33 ft
0.38 ft
0.95 ft × 100 ft × 100 ft = 9,500 CF = 351 Cy in place = 422 Cy = 591 tons

∴ from page 2 22,935 tons
591 tons
22,344 tons of total lead >500 ppm

FOIL206874

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HALEY & ALDRICH, INC.

CALCULATIONS

Client	Roth Bros. Smelting Corp.	File No.	70185-43
Project	CHS - Addendum	Sheet	1 of 3
Subject	Estimate #3 (Pb > 825 ppm, PCBs > 25 ppm)	Date	12 March 94
		Computed By	MJC
		Checked By	SEW

Calculation of PCBs > 25 ppm Volume

Area 1

0.35 × 3.0 ft = 1.05 ft.

Total = 1.05 ft × 100 ft × 100 ft
Total = 10,500 CF / 27
Total = 389 CY (1.2 bulking factor)
Total = 467 Cy (1.4 tons/Cy)
Total = 653 tons

Calculation of PCBs > 50 ppm Volume

Area 1
0.24 × 3.0 ft. = 0.72 ft

Area 2
0.33 × 3.0 ft = 0.99 ft.

Area 3
0.38 × 4.0 ft = 1.52 ft.

Total = 3.23 ft × 100 ft × 100 ft.
Total = 32,300 CF / 27
Total = 1,196 Cy (1.2 bulking factor)
Total = 1,436 Cy (1.4 tons/Cy)
Total = 2008 tons

C/L1AFH.FRP 3 June 1993

FOIL206875

HALEY & ALDRICH, INC.

CALCULATIONS

Client	Roth Bros. Smelting Corp.	File No.	70185-43
Project	CMS - Addendum	Sheet	2 of 3
Subject	Estimate #3 (Pb > 825 ppm, PCBs > 25 ppm)	Date	12 March '94
		Computed By	MJC
		Checked By	SBW

Calculation of Total lead > 825 ppm Volume:

Area 1
0.62 × 3.0 ft = 1.86 ft

Area 2
0.08 × 1.5 ft = 0.12 ft

Area 3
0.28 × 1.0 ft = 0.28 ft

Area 4
0.10 × 1.0 ft = 0.10 ft.

Area 5
0.07 × 2.3 ft = 0.161 ft

Area 6
0.16 × 2.5 ft = 0.40 ft

Area 7
0.09 × 4.0 ft = 0.36 ft.

Area 8
0.07 × 1.3 ft = 0.091 ft

Area 9
0.09 × 4.0 ft 0.36 ft

Area 10
0.31 4.0 ft 1.24 ft

Area 11
0.27 × 3.0 ft = 0.81 ft

Area 12
0.43 × 3.0 ft = 1.29 ft

Area 13
0.32 × 4.0 ft = 1.28 ft

Area 14
0.27 × 1.5 = .405 ft

Area 15
0.09 × .1 ft = .009

Area 16
0.26 × 3.0 ft = 0.78 ft.

Area 17
3.25 × 4.0 ft = 13.0 ft

Area 18
2.27 × 3.5 ft = 7.945 ft

Area 19
.71 × 1.0 ft = .71 ft

Total = 31.201 ft × 100 ft × 100 ft
Total = 312,010 CF / 27
Total = 11,556 CY (1.2 bulking factor)
Total = 13,867 CY (1.4 tons/CY)
Total = 19,414 tons

FOIL206876

CALIAFH.FRP 3 June 1993

HALEY & ALDRICH, INC.	CALCULATIONS	File No. 70185-43
Client: Roth Bros. Smelting Corp.		Sheet 3 of 3
Project: CMS - Addendum		Date 12 March '94
Subject: Estimate #3 (Pb >825 ppm, PCBs >25ppm)		Computed By MJC
		Checked By SBW

For Final total volumes need to subtract areas of PCBs > 25 ppm that are within total lead areas of 825 ppm.

PCB Areas

0.35 × 3.0 ft = 1.05 ft

1.05 ft × 100 ft × 100 ft = 10,500 CF / 27 = 389 CY in place = 467 Cy = 653 tons

∴ from page 1

653 tons
- 653 tons
0 tons of PCBs > 25 ppm

Also need to subtract areas of PCBs > 50 ppm that are within total lead areas of 250 ppm

0.33 ft.
+ 0.28 ft.
0.61 ft × 100 ft × 100 ft = 6,100 CF / 27 = 225 CY in place = 270 Cy = 378 tons

∴ from page 2

19,414 tons
378 tons
19,036 tons of total lead > 825 ppm

CALC1AFH.FRP 3 June 1993

FOIL206877

APPENDIX B

TCLP Lead Estimate Cost Details

HALEY & ALDRICH, INC.	CALCULATIONS	File No. 70185-43
		Sheet 1 of 2
Client: Roth Bros. Smelting Corp.		Date: 12 March '94
Project: CMS - Addendum		Computed By: MJC
Subject: TCLP Remediation Areas		Checked By: SBW

TCLP Remediation Areas > 5 ppm.

Area 1
0.62 x 3.0 ft = 1.86 ft.

Area 2
0.09 x 1.0 ft = 0.09 ft

Area 3
0.10 x 1.0 ft = 0.10 ft

Area 4
0.16 x 2.5 ft = 0.40 ft

Area 5
0.09 x 4.0 ft = 0.36 ft

Area 6
0.12 x 3.0 ft = 0.36 ft

Area 7
0.29 x 3.5 ft = 1.015 ft.

Area 8
0.22 x 5.0 ft = 1.10 ft

Area 9
0.09 x 5.0 ft = 0.45 ft

Area 10
0.41 x 3.0 ft = 1.23 ft

Area 11
1.14 x 3.5 ft = 3.99 ft.

Area 12
0.69 x 2.5 ft = 1.725 ft

Total = 12.68 ft
Total = 12.68 ft. x 100 ft x 100 ft
Total = 126,800 CF / 27
Total = 4,696 CY (1.2 bulking factor)
Total = 5,635 Cy (1.4 tons / Cy)
Total = 7,889 tons

HALEY & ALDRICH, INC.

CALCULATIONS

File No.	70185-43
Sheet	2 of 2
Date	12 March '94
Computed By	MJC
Checked By	SBW

Client: Roth Bros. Smelting Corp.
Project: CMS - Addendum
Subject: TCLP - Remediation Areas

TCLP Lead Remediation Areas > 0.1 ppm

Area 1
0.62 × 3.0 ft = 1.86 ft

Area 2
0.08 × 1.5 ft = 0.12 ft

Area 3
0.46 × 1.0 ft = 0.46 ft

Area 4
0.07 × 2.3 ft = 0.161 ft

Area 5
0.16 × 2.5 ft = 4.0 ft

Area 6
0.09 × 4.0 ft = 0.36 ft

Area 7
0.07 × 1.3 ft = 0.091 ft

Area 8
0.09 × 4.0 ft = 0.36 ft

Area 9
0.31 × 4.0 ft = 1.24 ft

Area 10
0.97 × 3.0 ft = 2.91 ft

Area 11
0.89 × 3.5 ft = 3.115 ft

Area 12
0.22 × 5.0 ft = 1.10 ft

Area 13
0.41 × 3.0 ft = 1.23 ft

Area 14
2.73 × 3.5 ft = 9.555 ft

Area 15
0.08 × 1.5 ft = 0.12 ft

Area 16
0.40 × 3.0 ft = 1.20 ft

Area 17
1.20 × 3.0 ft = 3.6 ft

Area 18
0.09 × 5.0 ft = 0.45 ft

Area 19
0.43 × 1.0 ft = 0.43 ft

Total = 32.362 ft × 100 ft × 100 ft
Total = 323,620 CF / 27
Total = 11,986 Cy (1.2 bulking factor)
Total = 14,383 (1.4 tons / Cy)
Total = 20,136 tons

FOIL206880

APPENDIX D

Estimated Cost Detail Description for
Polysilicate/Stabilization

MEDIA: Soil – Worksheet 1
REMEDIAL TECHNOLOGY: Polysilicate Stabilization

Activities/Work Items

1.	Mob/demob equipment.
2.	Excavate.
3.	Stabilize 21,042 tons.
4.	Haul stablized PCB soil >50 ppm for off-site disposal
5.	Backfill, compact, re-grade excavations.
6.	Repave excavated areas.
7.	Monitor source areas following remediation of excavated soils.

MEDIA Soil – Worksheet 2
REMEDIAL TECHNOLOGY: Polysilicate Stabilization

Unit Cost Estimates

Item	Quantity	Unit	Unit Cost	Capital	O&M
1. Regulatory Requirements (See attached for specific work items)	1	LS	$21,000–$54,000	$21,000–$54,000	
2. Mobilization/Site Improvement (See attached for specific work items)	1	LS	$61,000–$110,000	$61,000–$110,000	
3. Operations (See attached for specific work items)	21,042	Ton	$32–$56	$673,344–1,178,352	
4. Remediate >50 ppm PCB Soil					
A. Load 1434 Cy (after stablized)	1,434	Cy	$6	$8,604	
B. Haul 16.5 Cy dump trailer (20 mi. round trip)	1,434	Cy	$12	$17,208	
C. Dispose of Soil	2,008	Ton	$275–$360	$552,200–$722,880	
5. Demobilization (See attached for specific work items)	1	LS	$57,400–$62,000	$57,400–$62,000	
6. 6" Soil Clay Cap					
A. Backfill	2,060	Cy	1.33	$2,739	
B. Compaction	2,060	Cy	0.55	$1,133	
7. Semi–Annual Groundwater Monitoring 8 wells	16	Sample	$215		$3,440
8. Sample Crew/Sampling Equip. 2 @ 1 yr. @ 16 hrs.	32	Hr.	$70		$2,240
9. Validate sample 1 hr/sample	16	Hr.	$80		$1,280
		Subtotal		$1,394,628 – 2,156,916	$6,960
		Engineering (30%)		$418,388 – 647,074	$2,088
		Contingency (10%)		$139,462 – 215,691	$696
		Administration (10%)		$139,462 – 215,691	$696
				$2,091,940 – 3,235,372	$10,440

WORK ITEM BREAKDOWN

Regulatory Requirements
- Permitting
- Remedial Action Work Plan
- Health & Safety Plan
- Treatability Study
- Transportation Unit Closure Plan
- Travel/Expenses

Operations
- Excavate 12,525 cy
- Screening to 3/4 in. minus
- Stockpile oversized material
- Blending for treatment
- Treatment 21,042 tons
- Retreatment if necessary
- Backfill of treated material
- Compaction volume increase 0% to 15%

Mobilization/Site Improvements
- Treatment Equipment
  - Rubber–tire loader
  - Track excavator
  - Track loader
  - Office Trailer
- Operations personnel travel & expenses
- Calibration of weight equipment
- Site survey
- Grading, berm construction
- Execute Health & Safety Plan
- Air Monitoring
- Pre–project medical examinations

Demobilization
- Decontamination
- Teardown
- Loading/shipping
- Packaging of waste
- Closure certification
- Survey
- Physical exams
- Closure report

Net Present Value

ALTERNATIVE: Polysilicate Stabilization
Low End of Range

Year	Capital Cost	O & M	O & M (pv)
1	2091940	10440	10440
2	0	10962	10245
3	0	11510	10053
4	0	12086	9865
5	0	12690	9681

Total Capital Cost:	2091940
Total O& M(pv):	50285
PROJECT NET PRESENT VALUE:	$2,142,225

Basis: Inflation @ 5%
Cost of Money @ 7%

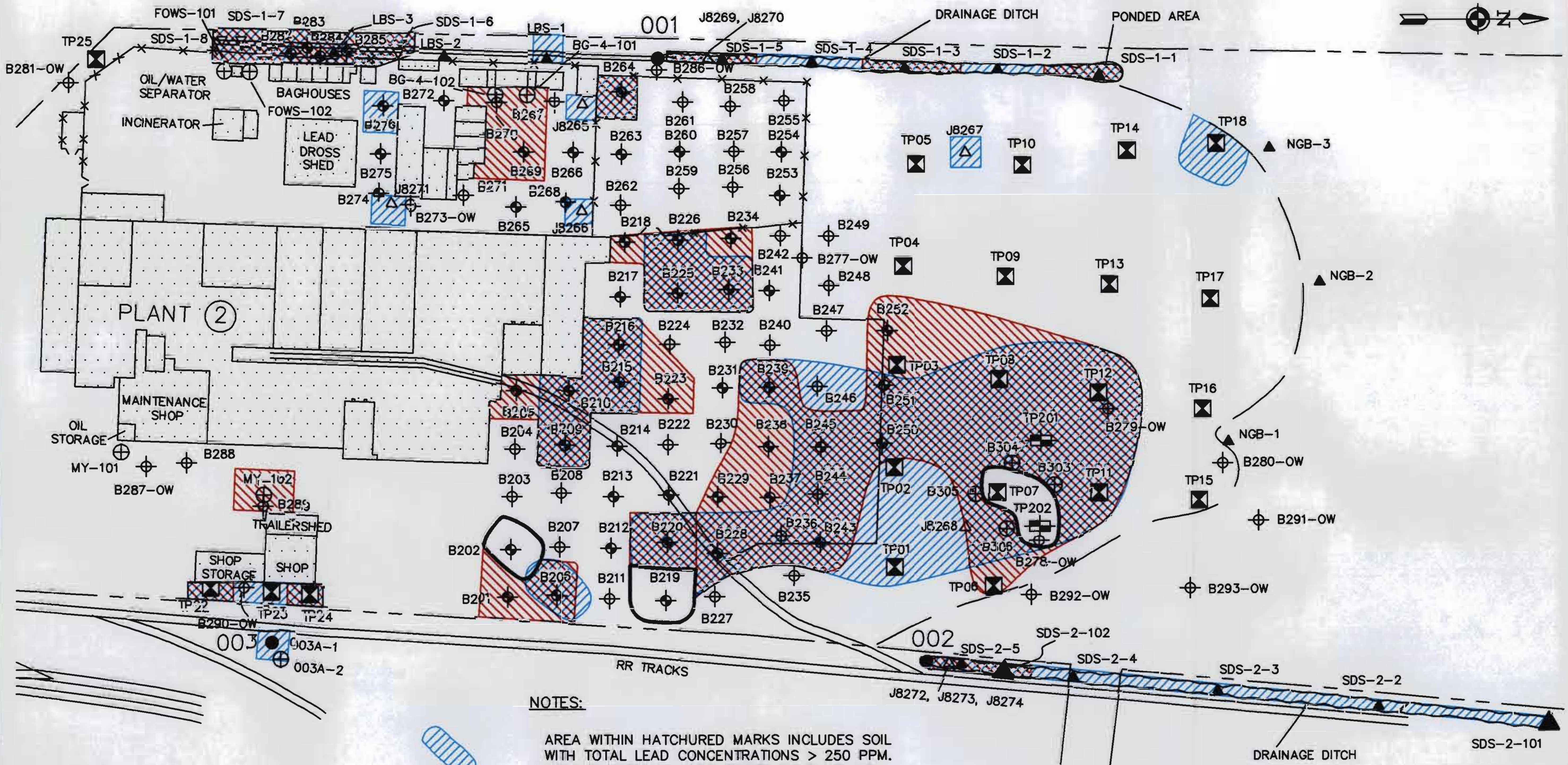
Net Present Value

ALTERNATIVE: Polysilicate Stabilization
High End of Range

Year	Capital Cost	O & M	O & M (pv)
1	3235372	10440	10440
2	0	10962	10245
3	0	11510	10053
4	0	12086	9865
5	0	12690	9681

Total Capital Cost:	3235372
Total O& M(pv):	50285
PROJECT NET PRESENT VALUE:	$3,285,657

Basis: Inflation @ 5%
Cost of Money @ 7%



NOTES:

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH TOTAL LEAD CONCENTRATIONS > 250 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH PCB CONCENTRATIONS > 1 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

BOLDED AREA INCLUDES SOIL WITH PCB CONCENTRATIONS > 50 PPM. AREA IS ESIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

ACTUAL EXTENT OF COMPOUND PRESENCE MAY DIFFER.

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ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

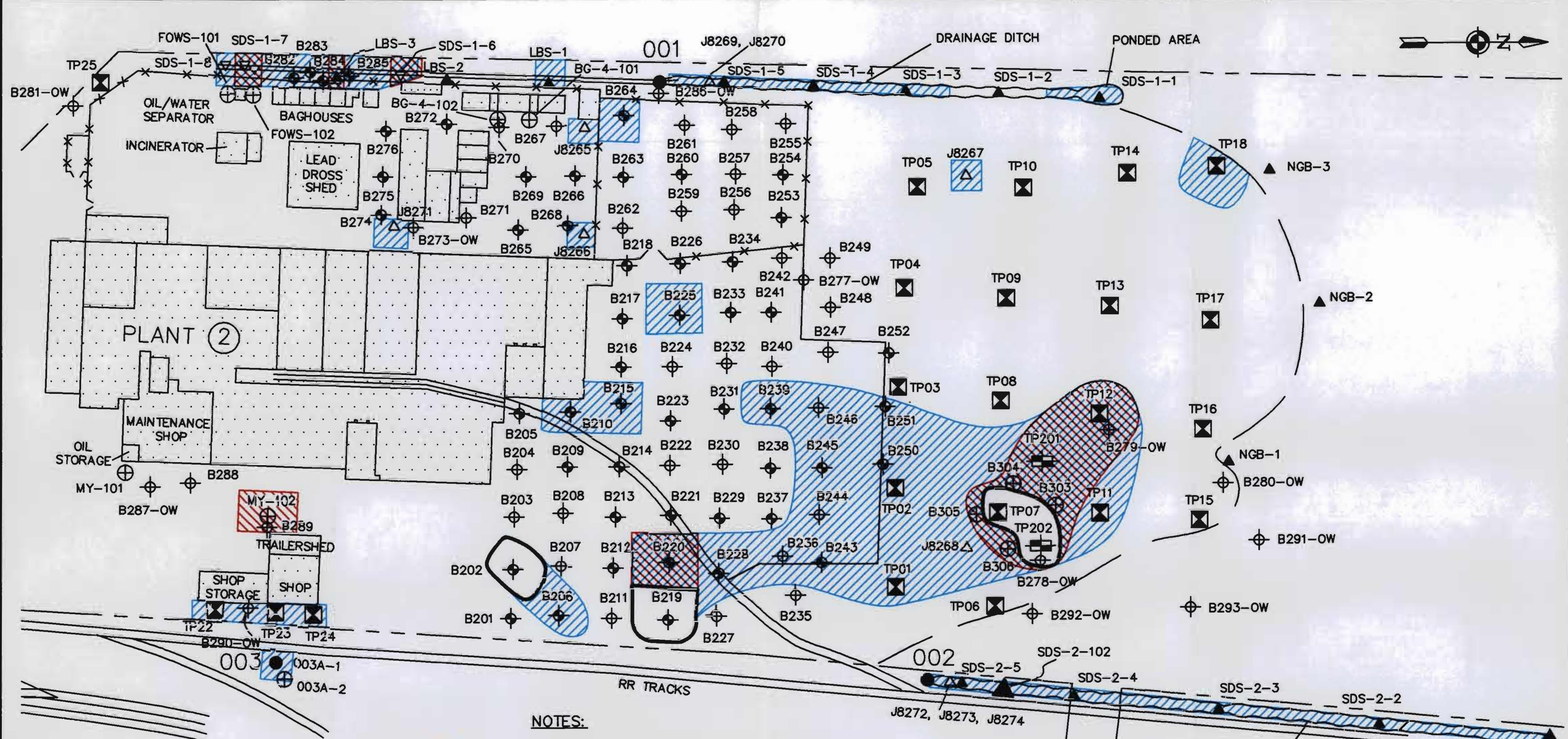
SCENARIO #1 - SOIL VOLUME

SCALE: 1 IN. = 100 FT. MARCH 1994

FILENAME: FIG1.DWG

FIGURE 1

FILE NO. 70185-43



NOTES:

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH TOTAL LEAD CONCENTRATIONS > 500 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH PCB CONCENTRATIONS > 10 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

BOLDED AREA INCLUDES SOIL WITH PCB CONCENTRATIONS > 50 PPM. AREA IS ESIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

ACTUAL EXTENT OF COMPOUND PRESENCE MAY DIFFER.

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Geotechnical Engineers & Environmental Consultants

ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

SCENARIO #2 - SOIL VOLUME

SCALE: 1 IN. = 100 FT.

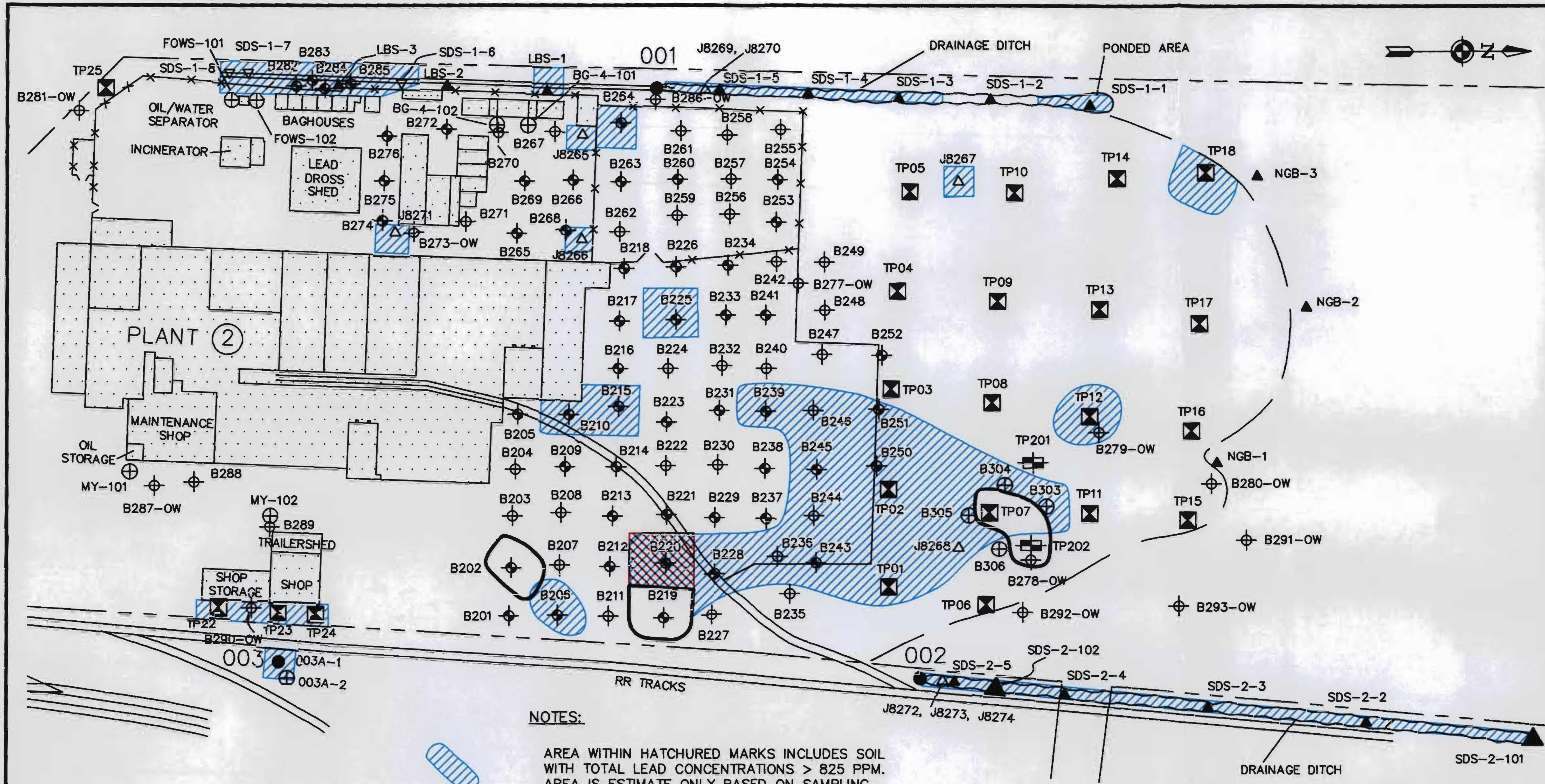
MARCH 1994

FILENAME: FIG2.DWG

FIGURE 2

FILE NO. 70185-43

FOIL206888



NOTES:

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH TOTAL LEAD CONCENTRATIONS > 825 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH PCB CONCENTRATIONS > 25 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

BOLDED AREA INCLUDES SOIL WITH PCB CONCENTRATIONS > 50 PPM. AREA IS ESIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

ACTUAL EXTENT OF COMPOUND PRESENCE MAY DIFFER.

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ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

SCENARIO #3 - SOIL VOLUME

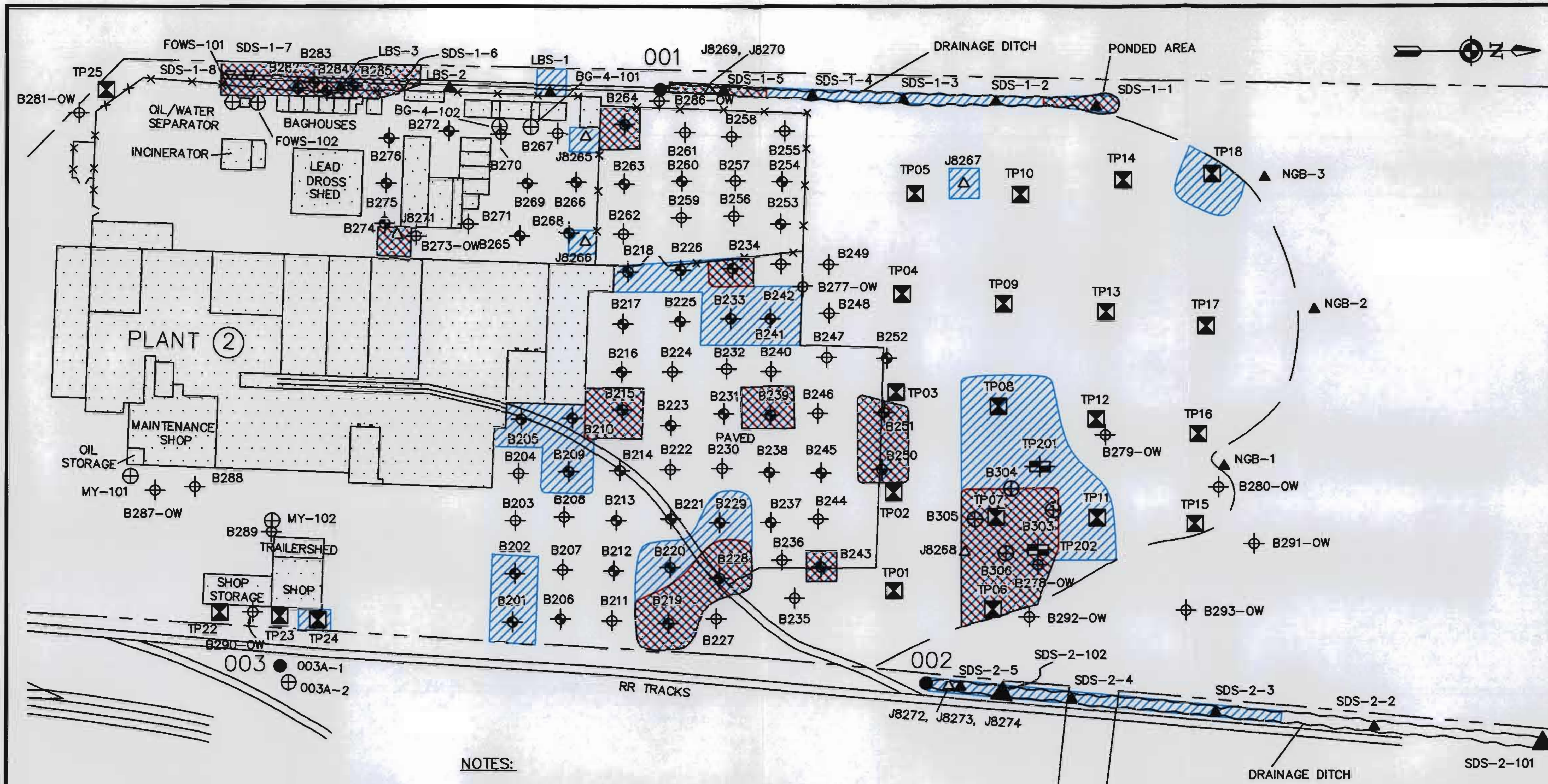
SCALE: 1 IN. = 100 FT.   MARCH 1994

FILENAME: FIG2.DWG

FIGURE 3

FILE NO. 70185-43

FOIL206889



NOTES:

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH TCLP LEAD CONCENTRATIONS > 0.1 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH TCLP LEAD CONCENTRATIONS > 5 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

ACTUAL EXTENT OF COMPOUND PRESENCE MAY DIFFER.

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ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

TCLP LEAD REMEDIATION AREAS

SCALE: 1 IN. = 100 FT.

MARCH 1994

FILENAME: FIG4.DWG

FIGURE 4

FILE NO. 70185-43